Chapter 1

Drinking Water

DRINKING WATER

PUBLIC DRINKING WATER SYSTEMS

Indicator 1. Public Drinking Water Systems

Background The federal Safe Drinking Water Act of 1974 and its amendments regulate the nation's public drinking water to ensure it is safe for consumption. An estimated 3,516,272 Kentuckians (87 percent) now have access to public drinking water provided by 656 public drinking water systems.[1] But access to public drinking water varies greatly by county. For example, only 37 percent of households in Knott County are served by public water systems, compared to 100 percent in Fayette County.[2]

About 90 percent of the water withdrawn for drinking is supplied by streams, lakes and reservoirs, with the remainder coming from groundwater sources. The five largest drinking water systems serve nearly one-third of all Kentuckians that have access to public water.

Pollutants can enter raw drinking water sources in a number of ways and come from a variety of sources. In Kentucky, polluted runoff from farmlands, coal mines and discharges from wastewater treatment plants are the greatest sources of water pollution.[3] Other pollution sources include failing septic systems, sewage straight pipes, waste sites, urban runoff, combined sewer overflows and toxic spills.

Goal Ensure public drinking water meets health based standards.

At a Glance

Number of Kentuckians served by public drinking water
2000. . . . . .3.5 million

Number of public drinking water systems
1993 840
2000. 656

Public drinking water systems with violations
1993 423
2000 316

Progress Kentucky assumed authority in 1977 from the U.S. Environmental Protection Agency (EPA) to implement the provisions of the Safe Drinking Water Act. During 2000, 48 percent of the 656 public drinking water systems permitted to operate in Kentucky had violations of Safe Drinking Water Act rules. A majority of the 871 violations cited in 2000 were for failure to properly monitor (49 percent) and failure to submit monthly operation reports (31 percent).

Thirteen percent of the 871 violations cited in 2000 were for failure to issue consumer confidence reports. Consumer confidence reports are required under federal and state law. By 2001, every customer served by a community water system should have access to a consumer confidence report that contains information about the system's source water and the quality of the drinking water.[4] These yearly reports detail violations of water quality standards and treatment rules.

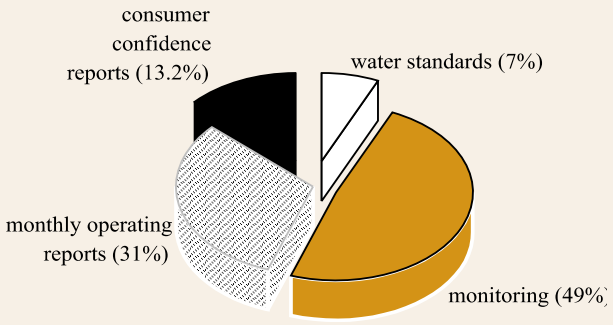
Seven percent of the violations cited in 2000 were for exceeding Maximum Contaminant Level (MCL) health-based drinking water standards. Forty-eight public drinking water systems had violations of MCL standards in 2000. Small public water systems remain the greatest violators of drinking water regulations. A small system is defined as serving fewer than 3,300 people. During 2000, 240 small systems accounted for 76 percent of the drinking water violations. Many small systems do

Measure 1. Public Drinking Water Systems and Violations Trends in Kentucky

Facility Size (Population Served)	Number of Systems*			Number of Systems w/Violations**			Number of Drinking Water Violations** (percent total)		
	1993	1997	2000	1993	1997	2000	1995	1997	2000
<100	220	168	126	130	68	70	733 (46%)	620 (47%)	322 (37%)
101-500	188	145	118	90	58	75	436 (27%)	227 (31%)	251 (29%)
501-1,000	65	55	46	19	19	24	80 (5%)	50 (7%)	45 (5%)
1,001-2,500	132	128	116	64	35	55	129 (8%)	72 (10%)	93 (11%)
2,501-3,300	46	45	34	30	9	16	59 (4%)	14 (2%)	27 (3%)
3,301-5,000	47	47	55	23	13	22	50 (3%)	13 (2%)	45 (5%)
5,001-10,000	80	80	81	41	24	31	80 (5%)	39 (5%)	55 (6%)
10,001-50,000	57	57	75	25	15	22	35 (2%)	20 (3%)	31 (4%)
50,001-100,000	3	3	1	1	1	1	1(<1%)	1 (<1%)	2 (<1%)
>100,000	2	2	4	0	2	0	0 (0%)	4 (<1%)	0 (0%)
Total	**840**	**730**	**656**	**423**	**239**	**316**	**1,603**	**729**	**871**

Public Drinking Water Systems

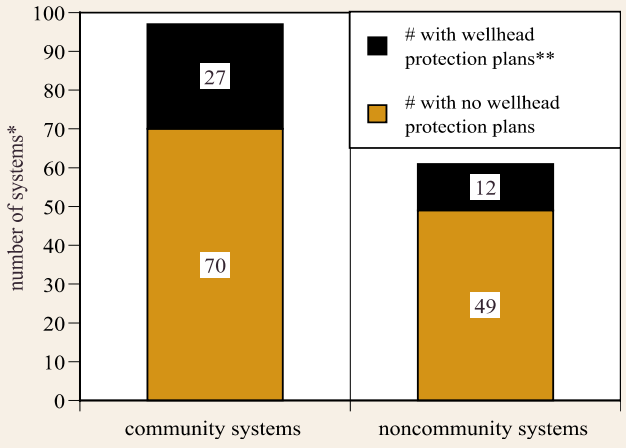
Measure 2. Types of Public Drinking Water Violations in Kentucky (2000)



Measure 3. Public Drinking Water Systems in Significant Noncompliance (2000)

Water System	County	Population Served
Kettle Island Water System	Bell	396
Shouses Mobile Home Park	Breathitt	35
Blue Diamond Camp	Harlan	59
Total 3		**490**

Measure 4. Drinking Water Systems with Wellhead Protection Programs in Kentucky



not have the expertise, equipment or resources to meet various requirements of the Safe Drinking Water Act. The Kentucky Division of Water has encouraged mergers of small nonviable systems in an effort to improve drinking water quality. Between 1979 and 2000, 555 drinking water system mergers have occurred. Mergers have eliminated a number of poorly operated drinking water plants. For example, during 2000, only three public water systems serving a total of 490 people were in significant noncompliance with drinking water rules, compared to 13 systems in 1997.

As a result of the Safe Drinking Water Act Amendments of 1996, all states are required to develop a Source Water Assessment Program (SWAP). A key component of Kentucky's SWAP is an assessment of a water source's susceptibility to contamination. Currently, 97 community systems (those systems that serve customers year round) depend on groundwater for public drinking supplies. To date, 27 community drinking water systems have wellhead protection plans.

There are also 61 noncommunity systems that rely on groundwater for drinking water supplies. Noncommunity systems are defined as serving the same people at least 6 months of the year and typically include industries, schools and state parks. Currently, 12 of these systems have developed wellhead protection plans to protect groundwater supplies. All groundwater dependent public water systems will be required to complete wellhead protection plans by May 2003.

Footnotes

1. As estimated by Ky. Division of Water, Drinking Water Branch by multiplying the number of service connections for community public drinking water systems by a factor of 2.6 persons per household (1990 Census).
2. Ibid.
3. 1998 and 2000 305b Report, Ky. Division of Water.
4. U.S. EPA Safe Drinking Water Goals for 2005, U.S. EPA, December 1999.

Measures - notes and sources

***Measure 1**. *Includes public community, noncommunity and nontransient systems. **Includes violations of drinking water standards (MCLs), monitoring and reporting violations. Includes Phase II and V chemical testing but not bottled water facilities. Percents rounded. Source: Ky. Division of Water.*
***Measure 2.** Based on 871 violations. Includes Phase II and V chemical testing results. Source: Ky. Division of Water.*
***Measure 3**. Includes community water systems with monitoring, reporting and MCL violations. Significant noncompliance are systems with 12 or more monitoring or MCL violations in any 12-month period. Source: Ky. Division of Water.*
***Measure 4**. Based on systems dependent on groundwater as a drinking water source. *Plans approved or under development. Source: Ky. Division of Water.*

DRINKING WATER

PUBLIC DRINKING WATER QUALITY

Indicator 2. Public Drinking Water Quality

Background While public drinking water in the United States is considered among the safest in the world, its safety cannot be taken for granted. Violations of Safe Drinking Water Act standards continue to occur in Kentucky and pose risks to public health. Most violations occur at smaller drinking water facilities. The most common drinking water contaminants detected in Kentucky are bacteria (an indication water may be contaminated with fecal matter); turbidity or cloudiness (which can interfere with the treatment process and allow pathogens to survive); trihalomethanes (organic chemicals created during the disinfection of water with chlorine); and inorganic chemicals (which include nitrates, mercury and barium).

Goal Ensure public drinking water can be safely consumed by meeting Safe Drinking Water Act rules and regulations that specify 103 health-based Maximum Contaminant Levels (MCLs).

Progress Trends reveal that violations of drinking water health-based MCL standards have been declining significantly during the past 15 years in Kentucky. Of the 656 public drinking water systems operating in the state, 4 percent, or 30 systems, had violations of MCLs during 2000. The MCL violations in 2000 included the following contaminants: bacteriological (10), turbidity (16) and trihalomethanes (22).

There are several facilities that are persistent violators of MCL standards. During 2000, an estimated 8,713 Kentuckians were at risk from 15 public drinking water systems with persistent violations of bacteria and turbidity standards. This is a significant improvement since 1997 when 27 systems serving 38,799 customers were considered persistent violators of bacteria and turbidity standards.

A majority of violations cited at drinking water plants are resolved; however, some result in fines. During 2000, three public drinking water systems were fined a total of $4,000.

Kentucky periodically conducts testing for various organic and inorganic chemicals as required by federal and state law. The most recent round of testing conducted between 1996 and 1998 found 63 violations of drinking water standards, a majority of which were for inorganic chemicals. The more common pollutants detected included naturally occurring chemicals such as nitrates, barium and cadmium; trihalomethanes, a disinfection by-product; pesticides such as atrazine, simazine, metolachlor and bromomethane; and chemical solvents including dibromomethane, xylene, trichloroethylene and tetrachloroethylene.

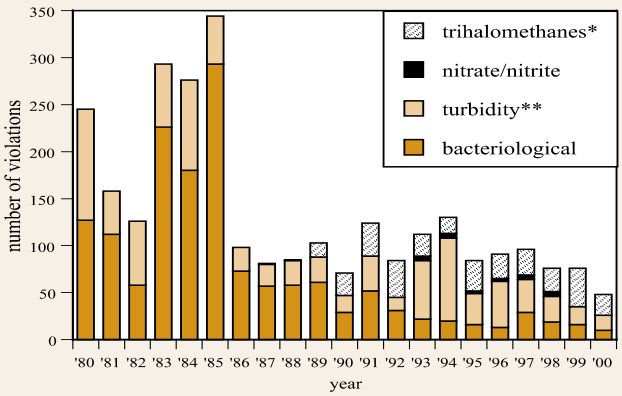
In January 2001, the U.S. EPA published a new standard for arsenic in drinking water that requires public water supplies to reduce arsenic to 10 parts per billion (ppb) by 2006. The new standard was based on a report by the National Academy of Sciences that concluded the current standard does not adequately protect public health. Arsenic in water has been linked to bladder, lung and skin cancer and may cause kidney and liver cancer, birth defects and reproductive problems. Arsenic also harms the central nervous

At a Glance

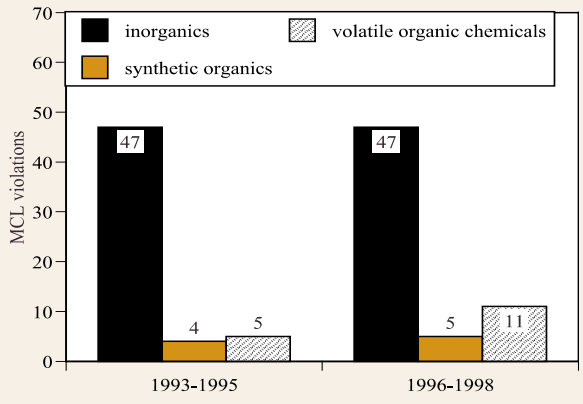
Violations of drinking water MCL standards
1995 84
1999 48

Number of systems with MCL violations
1995 39
2000 30

Measure 1. Public Drinking Water Standard Violations in Kentucky

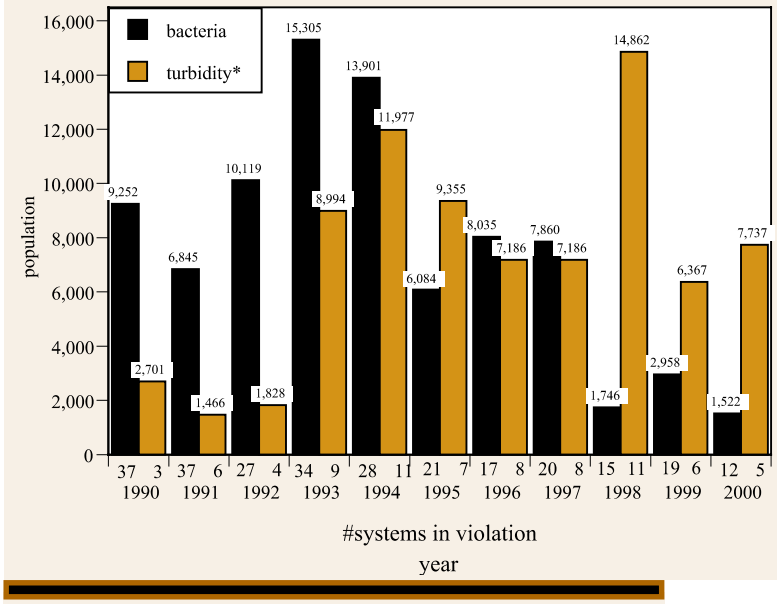


Measure 2. Public Drinking Water Standard Violations in Kentucky (Phase II and V Contaminants)



Public Drinking Water Quality

Measure 3. Population Served by Public Water Systems in Kentucky with Persistent Violations



Measure 5. Drinking Water Fines in Kentucky

Year	#Systems	$Fines*
1990	11	$41,585
1991	18	$59,950
1992	28	$69,825
1993	22	$71,125
1994	31	$62,300
1995	24	$44,375
1996	19	$66,850
1997	10	$16,950
1998	15	$33,600
1999	10	$29,700
2000	3	$4,000

Measure 4. Persistent Water System Violators of Safe Drinking Water Act Standards (2000)

Water System	County	Population Served
Kettle Island Water System*	Bell	396
Hillside Trailer Park	Boone	150
Shouses Mobile Home Park	Breathitt	35
Oakdale Christian H.S.	Breathitt	60
Shady Oak Trailer Park	Calloway	277
Dogwood Resort	Calloway	130
Kentucky Beach Resort	Calloway	85
Cumberland Co. Water District	Cumberland	5,200
Knott Co. Water District	Knott	283
Evarts Municipal	Harlan	1,708
Blue Diamond Camp*	Harlan	59
Jackhorn Water Supply*	Letcher	200
Bills Place	Owen	40
Fairview Grocery	Owen	40
Front Porch Store	Perry	50
Total 15		**8,713**

system and heart. Testing in Kentucky detected arsenic in 150 of the 239 public water systems sampled, with 15 having detections exceeding the proposed arsenic 10 ppb MCL in finished water. Two systems had more than one sample exceeding the proposed arsenic standard. The U.S. EPA is now reviewing this standard to ensure it is based on sound science and accurate cost estimates.[1] Approximately 90 percent of industrial arsenic in the U.S. is currently used as a wood preservative.[2] Agricultural applications, mining and smelting also contribute to arsenic releases in the environment.

Footnotes

1. "EPA Administrator Whitman Establishes Process to Evaluate Arsenic in Drinking Water Standard," U.S. EPA press release, April 18, 2001.

2. Drinking Water Standard for Arsenic, U.S. EPA , 815-F-00-015, January 2001.

Measures - notes and sources

***Measure 1**. Based on violations of Maximum Contaminant Levels (MCLs). *Trihalomethane monitoring not required prior to 1989. **More stringent turbidity standards took effect in 1993. Does not include monitoring and reporting violations for Phase II and V contaminants. Source: Ky. Division of Water.*

***Measure 2**. Based on Phase II and V testing. Source: Ky. Division of Water.*

***Measure 3**. Persistent violators are systems with four or more monitoring or MCL violations in any 12-month period. *More stringent turbidity standards took effect in 1993. Source: Ky. Division of Water.*

***Measure 4**. As of December 2000. Persistent violators are systems with four or more monitoring or MCL violations in any 12-month period for bacteria and/or turbidity. Some systems have both turbidity and bacterial violations. *Indicates system was also reported in violation in EQC 1998 report. Source: Ky. Division of Water.*

***Measure 5**. *Includes total civil and performance penalties assessed by calendar year. Source: Ky. Division of Water.*

DRINKING WATER

NOTICES AND ADVISORIES

Indicator 3. Boil Water Notices and Advisories

Background The number of boil water advisories has risen dramatically in Kentucky. The increase is likely due to increased awareness on the part of public water systems to issue advisories when the potential for contamination occurs, most often during waterline breaks. In many areas, drinking water distribution systems have not been maintained, resulting in deterioration, leakage and failure. Some water systems in Kentucky lose as much as 50 percent of their treated water due to leaks and waterline breaks, according to reports filed with the Kentucky Public Service Commission. Deteriorating pipes not only can cause water loss, but can allow the infiltration of contaminants during pressure losses. Extended periods where the temperature is below freezing are also a major cause of line breaks.

At a Glance

Number of boil water advisories/notices
1990. 52
1995. 91
2000. 556

Goal Ensure public drinking water can be safely consumed by ensuring that boil water advisories and notices are promptly issued.

Progress During 2000, there were 546 boil water advisories (issued when there is a potential for contamination) and 10 boil water notices (issued when bacteriological contamination is confirmed). This was a decrease from 1999, but still a dramatic increase as compared to earlier years. The Kentucky Division of Water generally attributes the rise to better education and awareness of water system operators to report potential contamination problems as well as more consistent reporting of waterline breaks. The number of consumer advisories has declined from a high of 14 in 1995 to one in 2000. The consumer advisory in 2000 was for potential contamination as a result of a broken water line near a gas station in Hindman, Ky.

During 2000, Pineville Water System led the state in notices/advisories with 53, followed by West Laurel Water Association (40), Olive Hill Municipal Water Works (33), Rattlesnake Ridge Water District (33) and Grayson Utility Commission (31).

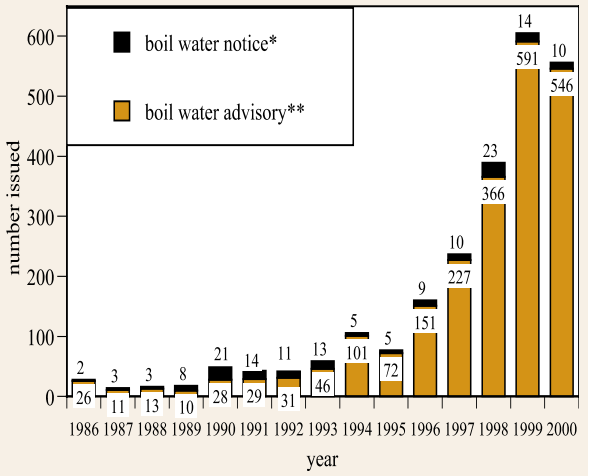
Boil water notices and advisories typically last a few days. However, some communities have experienced long-term advisories. For example, Evarts in Harlan County has had a number of boil water advisories since 1994 due to turbidity problems. In August 1998, the city declared an emergency in order to be eligible for federal funding to resolve problems at the drinking water plant. Emergency funding was obtained to replace the finished water storage tank which was in imminent danger of failure. Bandana Water System in Ballard County has also been on a long-term consumer advisory for nitrate contamination of its groundwater source caused by runoff of agricultural chemicals. New wells were drilled in 1999 and 2000 and nitrate values are now within the MCL standard.

Measures - notes and sources

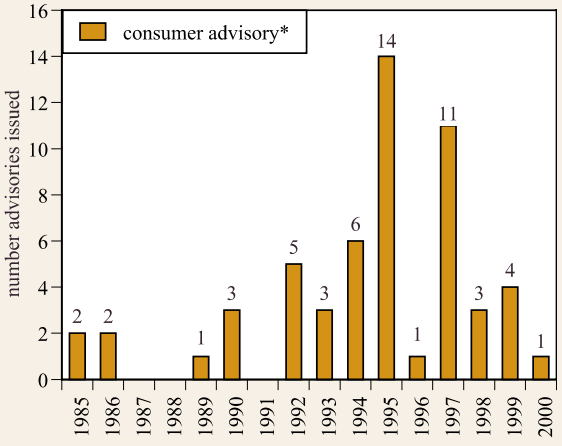
Measure 1. **Issued when there is potential for bacteriological contamination. **Issued when evidence shows bacteriological contamination. Source: Ky. Division of Water.*

Measure 2. **Issued when adverse health effects from consumption of water are possible or when other information of interest to consumer exists. Source: Ky. Division of Water.*

Measure 1. Boil Water Advisories and Notices in Kentucky



Measure 2. Consumer Advisories in Kentucky



Private Drinking Water

Indicator 4. Private Drinking Water Wells

At a Glance

Number of Kentuckians dependent of water wells, cisterns and springs for drinking 2000. 541,000

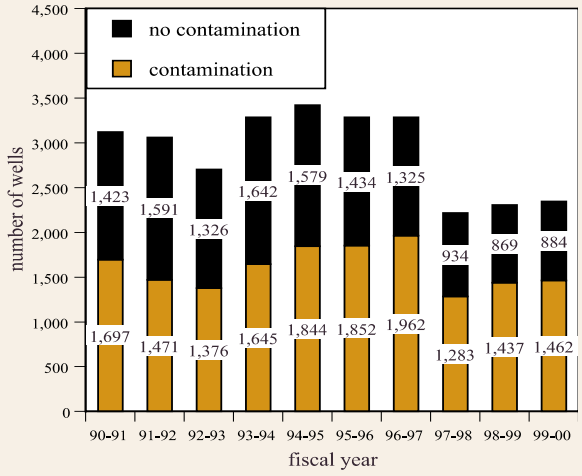
Testing of private wells (2000)
sampled. 2,346
contaminated. .1,462

Background An estimated 541,000 Kentuckians rely on private wells, springs or cisterns for drinking water, according to the Kentucky Division of Water. Households that depend on water wells are most numerous in eastern Kentucky and the far western portion of the state. In Kentucky and many other states, private drinking water sources are not required to be monitored for contamination, so it is not possible to determine the overall quality of this resource.

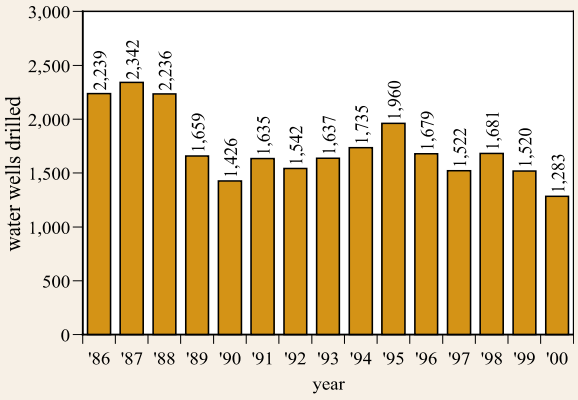
Groundwater has many potential sources of contamination. These include leaking underground storage tanks, raw sewage from failing septic systems, straight pipes and agricultural operations. Because more than half of Kentucky is underlain with karst topography, surface water and groundwater often mix, increasing the likelihood of groundwater contamination. Hand-dug and improperly constructed water wells are more susceptible to contamination.

Goal Ensure drinking water from private wells can be safely consumed by ensuring proper well construction and maintenance.

Measure 1. Voluntary Testing of Private Drinking Water Wells for Bacteria



Measure 2. Number of Domestic Water Wells Reported Drilled In Kentucky



Progress A review of individual water wells tested by local health departments upon request reveals 62 percent of the 2,346 water wells sampled during fiscal year 1999-2000, tested positive for total coliform bacteria—an indication the water may be contaminated. Contamination detected in water wells may not necessarily indicate the groundwater source is polluted but might be caused by pollution seeping or running off into the well from nearby septic tanks or other land use activities. Contamination of well water can also be the result of poor well construction and maintenance or problems with home distribution systems. According to state health officials, many private water wells are not routinely tested or properly maintained.

Kentucky has made progress in ensuring the safe construction of water wells in order to prevent contamination. Since 1985, state regulations have required all water well drillers to be certified. Currently, 106 drillers are certified in Kentucky. During fiscal year 1999-00, 3,117 new water wells were drilled in the state, according to state water well records. Of these 1,283 were for drinking.

Measures - notes and sources

Measure 1*. Tests of private wells for total coliform bacteria. Tests are requested by well owners. Source: Ky. Department for Public Health.*

Measure 2. *Source: Ky. Division of Water.*

DRINKING WATER

DRINKING WATER INFRASTRUCTURE

Indicator 5. Public Drinking Water Infrastructure

Background An estimated 3.5 million Kentuckians (87 percent of the Commonwealth's population) now have access to water from 656 public drinking water systems.[1] The remaining 541,000 Kentuckians rely on private water wells, cisterns, hauled water or other sources for drinking water.

An estimated $2.8 billion will be needed during the next 20 years to expand, upgrade and replace drinking water infrastructure as well as meet the requirements of the Safe Drinking Water Act, based on locally identified needs.[2] In 1999, the average Kentuckian used 65 gallons of water a day and paid $20 a month for public drinking water.[3]

Goal Improve and maintain drinking water infrastructure, develop a statewide strategic plan designed to ensure every household in Kentucky has access to potable water by 2020, and require water suppliers to develop long-range water supply plans by July 15, 1999.

At a Glance

Estimated drinking water infrastructure 20-year needs . . . . . .$2.8 billion

State drinking water revolving loan fund number projects 15
loans. . . $22.16 million

Number of counties with state approved long-range water supply plans 120

Progress In 1996, Congress amended the Safe Drinking water Act to provide states with $9.6 billion to help communities finance drinking water improvements. Kentucky was allocated $12.55 million in 1997, $10.85 million in 1998, $11.37 million in 1999 and $ 11.82 million in 2000 to set up a low interest state revolving loan fund to finance drinking water infrastructure and repairs. As of March 1, 2001, the state's Drinking Water Revolving Loan Fund, managed by the Kentucky Infrastructure Authority (KIA), has approved 15 drinking water projects valued at $22.16 million. There are seven additional projects for a total of $22 million in loans currently under review.

In 2000, the General Assembly expanded the role of the KIA to support drinking water infrastructure planning and development; promote higher levels of technical, managerial, and financial capacity of water-based utilities; and provide for investor-owned, private utilities. A new program, the 2020 Fund, was also added to KIA's grant and subsidized loan programs. The 2001-2002 state budget authorized $50 million in bond proceeds to finance the 2020 Fund for use as grants and/or low interest loans for water resource development. Funds can also be used to provide incentives to support improved planning and management of water infrastructure across the Commonwealth.

Kentucky also continues to make headway in planning for long-range water supply needs. The state's Water Supply Planning Program was created after the 1988 drought when many communities in the Commonwealth experienced drinking water supply shortages. In 1990, the General Assembly mandated long-range water supply plans be developed by every county by July 15, 1998 (later extended to July 15, 1999). All counties and/or water suppliers have received final state approval of their water supply plans.

Footnotes

1. Ky. Division of Water.
2. Water-Resource Development: A Strategic Plan, Draft, Water Resources Development Commission, October 1999.
3. Ibid.

Measures - notes and sources

***Measure 1**. Based on locally identified needs. Source: Water Resource Development Commission, 1999.*

Measure 1. Estimated Drinking Water Infrastructure Investment Needs in Kentucky (in millions of dollars)